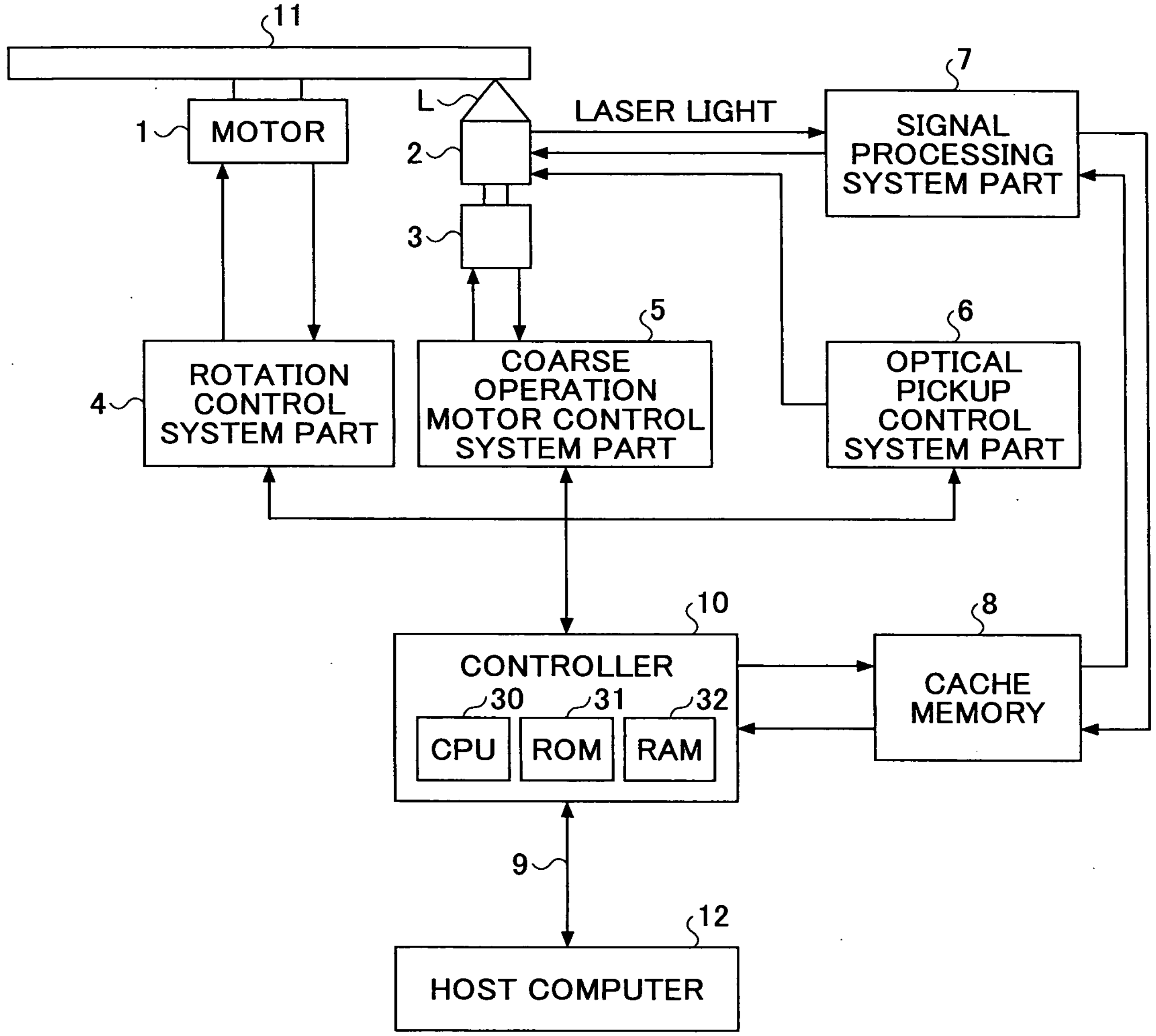
FIG.1



11
L
LASER LIGHT
7
SIGNAL PROCESSING SYSTEM PART
1
MOTOR
2
3
5
6
4
ROTATION CONTROL SYSTEM PART
COARSE OPERATION MOTOR CONTROL SYSTEM PART
OPTICAL PICKUP CONTROL SYSTEM PART
10
8
CONTROLLER
30
31
32
CPU
ROM
RAM
CACHE MEMORY
9
12
HOST COMPUTER

FIG.2

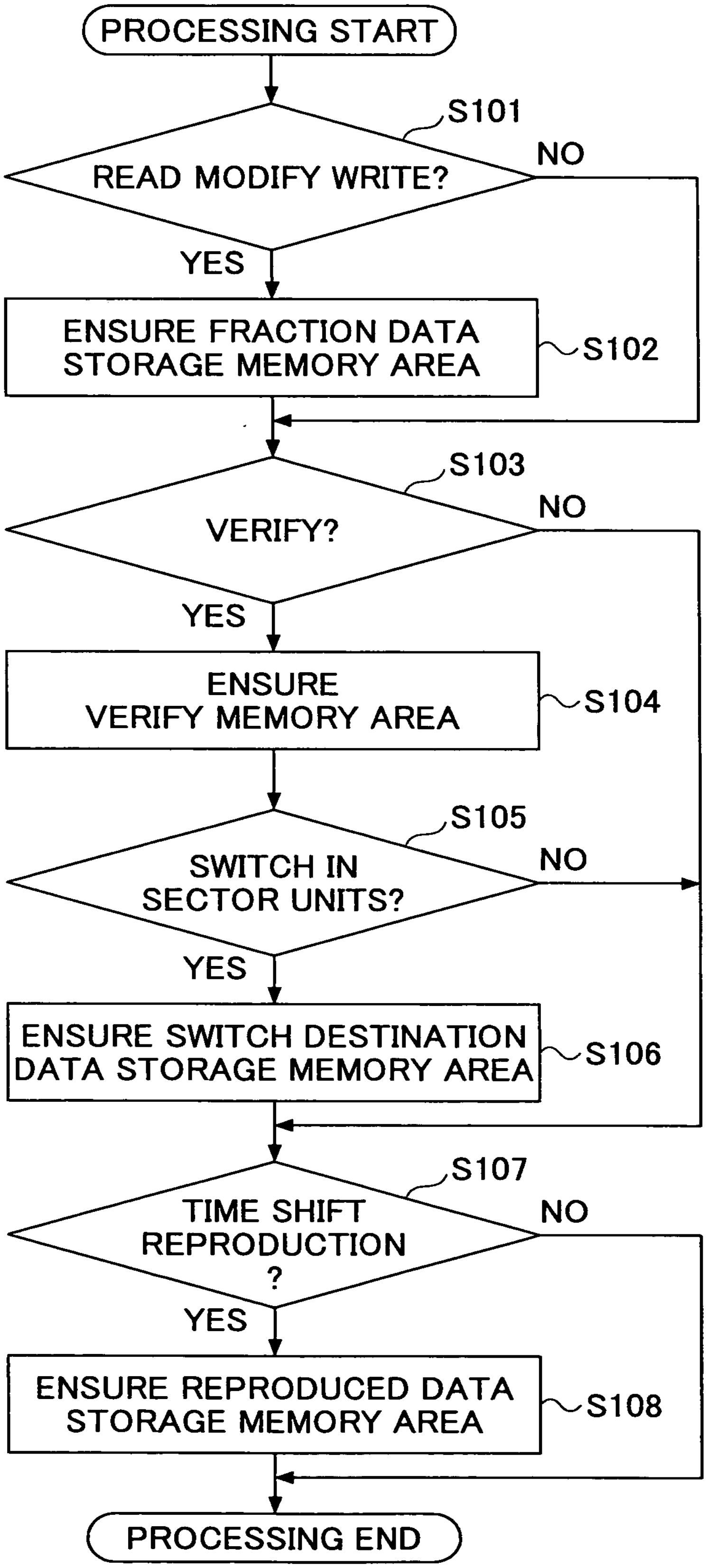

PROCESSING START
S101
READ MODIFY WRITE?
NO
YES
ENSURE FRACTION DATA STORAGE MEMORY AREA
S102
S103
VERIFY?
NO
YES
ENSURE VERIFY MEMORY AREA
S104
S105
SWITCH IN SECTOR UNITS?
NO
YES
ENSURE SWITCH DESTINATION DATA STORAGE MEMORY AREA
S106
S107
TIME SHIFT REPRODUCTION ?
NO
YES
ENSURE REPRODUCED DATA STORAGE MEMORY AREA
S108
PROCESSING END

FIG.3

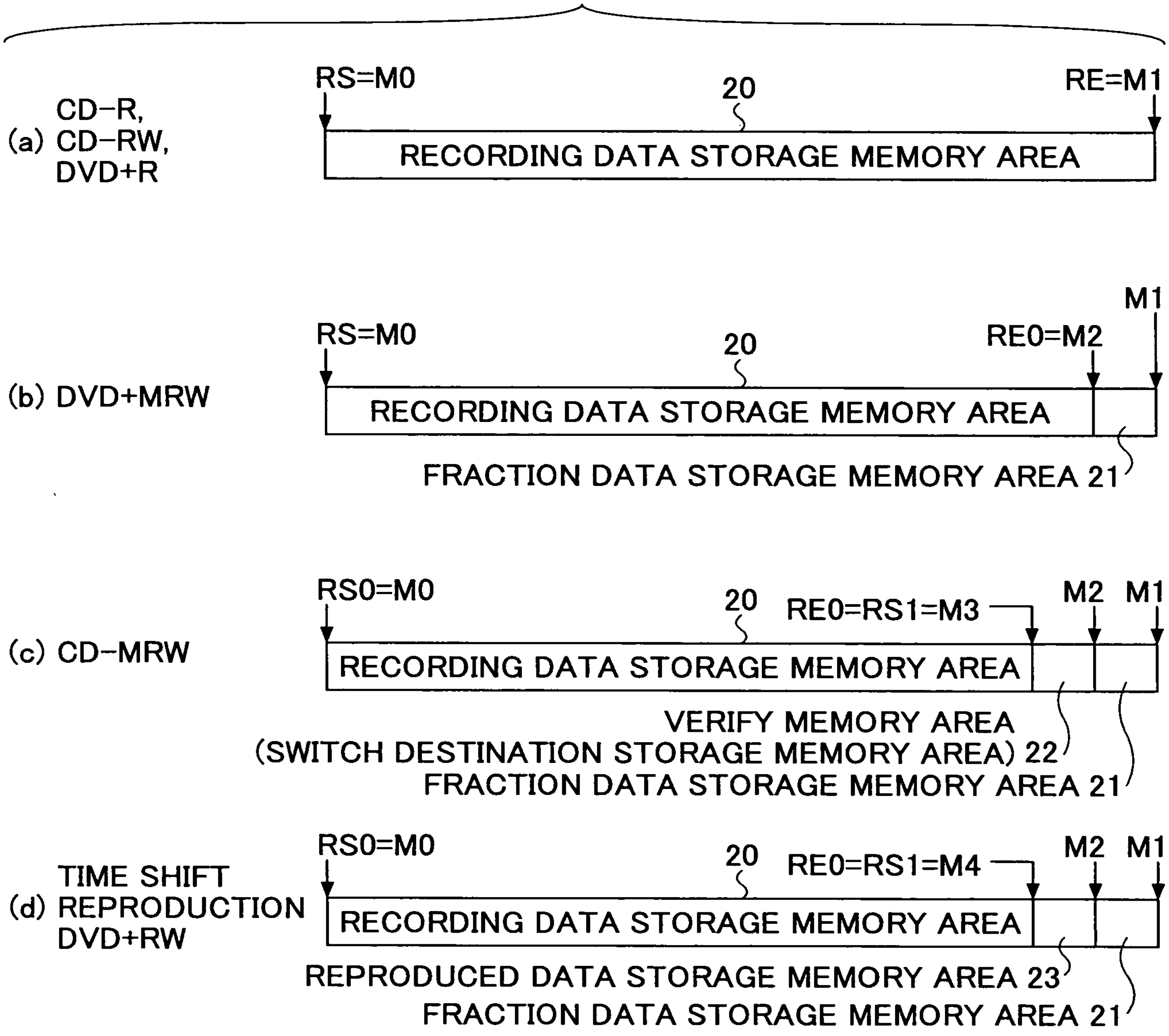

(a) CD-R, CD-RW, DVD+R
RS=M0
20
RE=M1
RECORDING DATA STORAGE MEMORY AREA
(b) DVD+MRW
RS=M0
20
RE0=M2
M1
RECORDING DATA STORAGE MEMORY AREA
FRACTION DATA STORAGE MEMORY AREA 21
(c) CD-MRW
RS0=M0
20
RE0=RS1=M3
M2
M1
RECORDING DATA STORAGE MEMORY AREA
VERIFY MEMORY AREA
(SWITCH DESTINATION STORAGE MEMORY AREA) 22
FRACTION DATA STORAGE MEMORY AREA 21
(d) TIME SHIFT REPRODUCTION DVD+RW
RS0=M0
20
RE0=RS1=M4
M2
M1
RECORDING DATA STORAGE MEMORY AREA
REPRODUCED DATA STORAGE MEMORY AREA 23
FRACTION DATA STORAGE MEMORY AREA 21

FIG.4

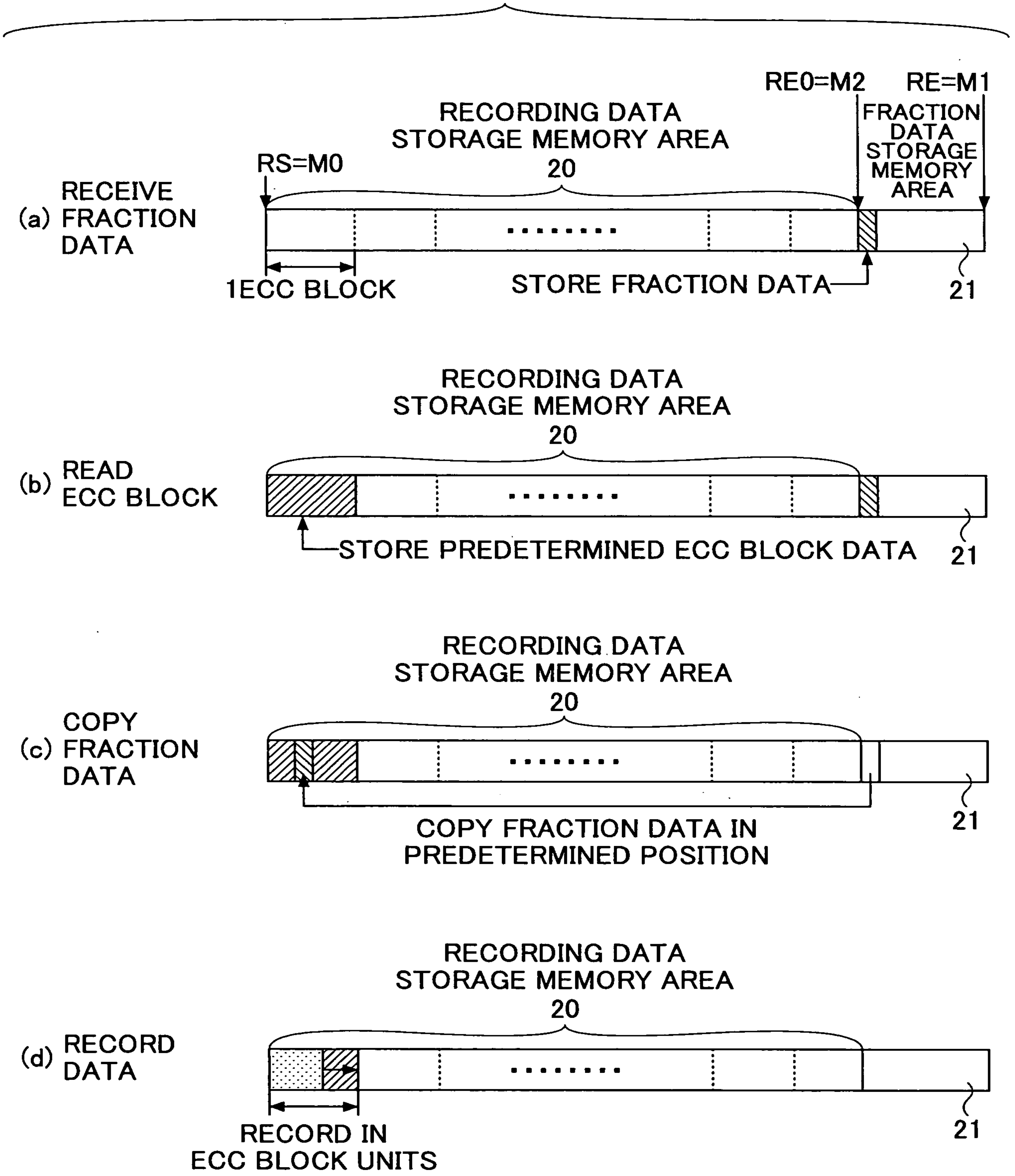

(a) RECEIVE FRACTION DATA
RECORDING DATA STORAGE MEMORY AREA
20
RS=M0
RE0=M2
RE=M1
FRACTION DATA STORAGE MEMORY AREA
1ECC BLOCK
STORE FRACTION DATA
21
(b) READ ECC BLOCK
RECORDING DATA STORAGE MEMORY AREA
20
STORE PREDETERMINED ECC BLOCK DATA
21
(c) COPY FRACTION DATA
RECORDING DATA STORAGE MEMORY AREA
20
COPY FRACTION DATA IN PREDETERMINED POSITION
21
(d) RECORD DATA
RECORDING DATA STORAGE MEMORY AREA
20
RECORD IN ECC BLOCK UNITS
21

FIG.5

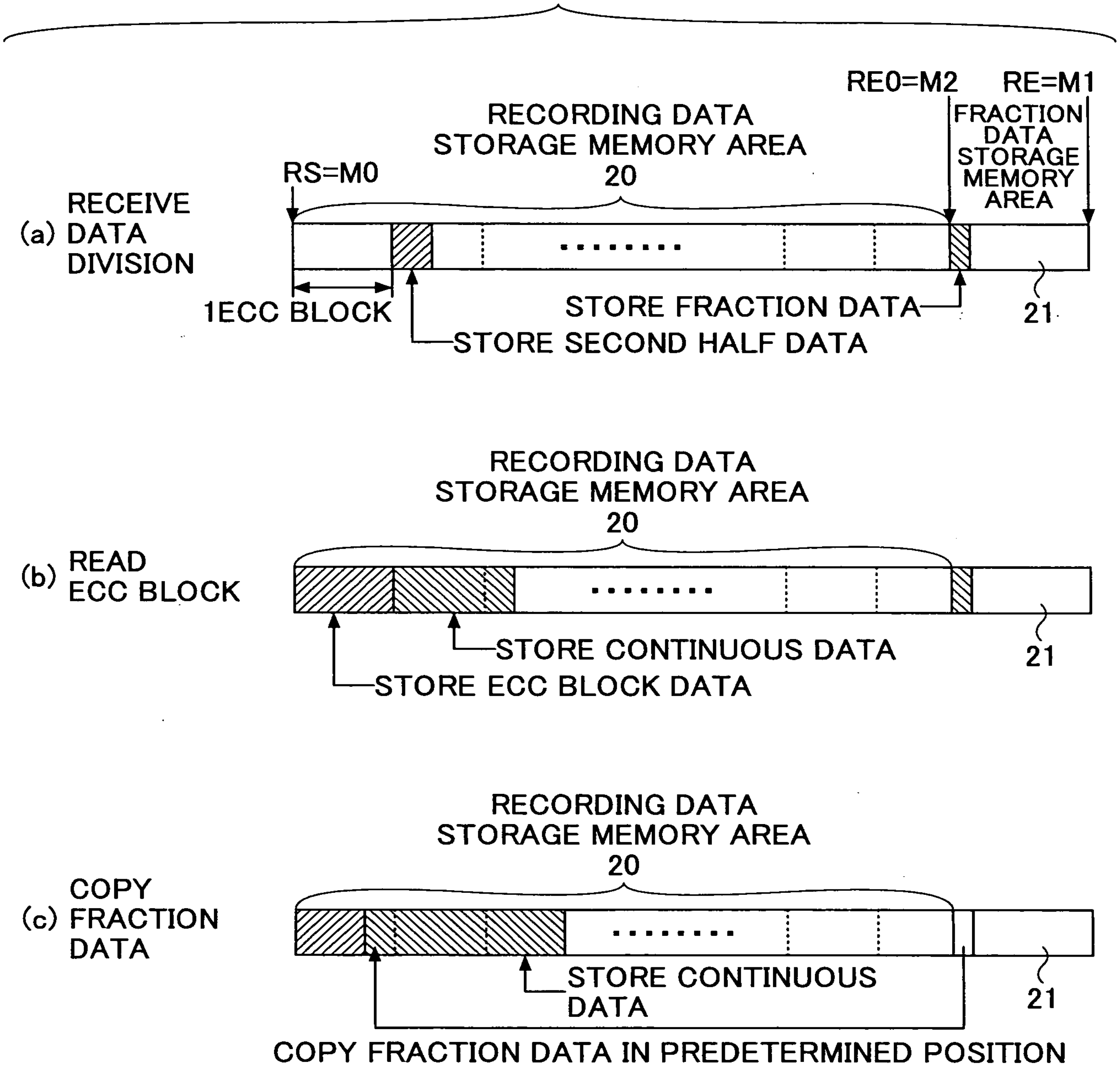

RE0=M2
RE=M1
RECORDING DATA STORAGE MEMORY AREA
20
FRACTION DATA STORAGE MEMORY AREA
RS=M0
(a) RECEIVE DATA DIVISION
1ECC BLOCK
STORE FRACTION DATA
21
STORE SECOND HALF DATA
RECORDING DATA STORAGE MEMORY AREA
20
(b) READ ECC BLOCK
STORE CONTINUOUS DATA
21
STORE ECC BLOCK DATA
RECORDING DATA STORAGE MEMORY AREA
20
(c) COPY FRACTION DATA
STORE CONTINUOUS DATA
21
COPY FRACTION DATA IN PREDETERMINED POSITION

FIG.6

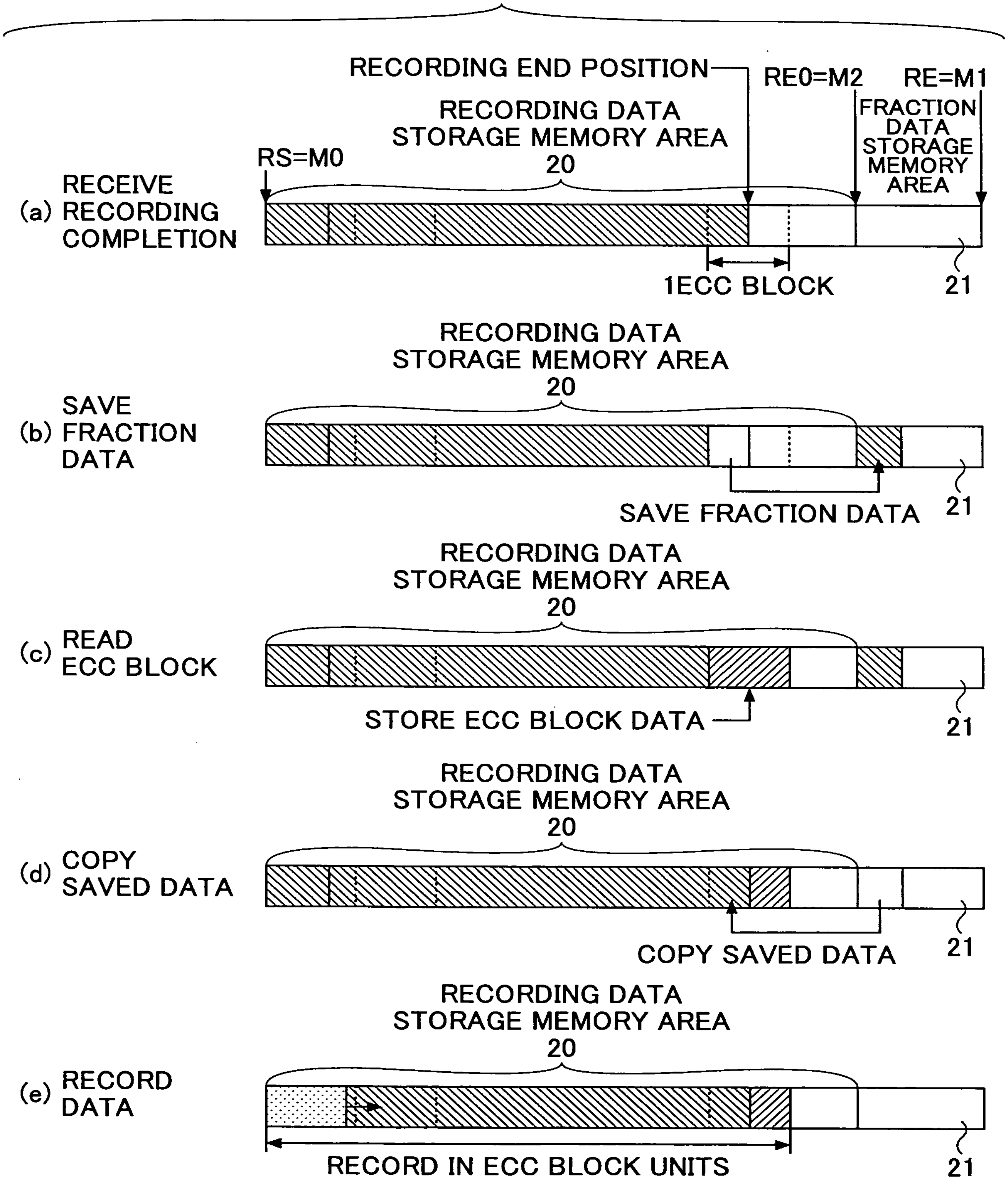

RECORDING END POSITION
RE0=M2
RE=M1
RECORDING DATA STORAGE MEMORY AREA 20
RS=M0
FRACTION DATA STORAGE MEMORY AREA
(a) RECEIVE RECORDING COMPLETION
1ECC BLOCK
21
RECORDING DATA STORAGE MEMORY AREA 20
(b) SAVE FRACTION DATA
SAVE FRACTION DATA
21
RECORDING DATA STORAGE MEMORY AREA 20
(c) READ ECC BLOCK
STORE ECC BLOCK DATA
21
RECORDING DATA STORAGE MEMORY AREA 20
(d) COPY SAVED DATA
COPY SAVED DATA
21
RECORDING DATA STORAGE MEMORY AREA 20
(e) RECORD DATA
RECORD IN ECC BLOCK UNITS
21

FIG.7

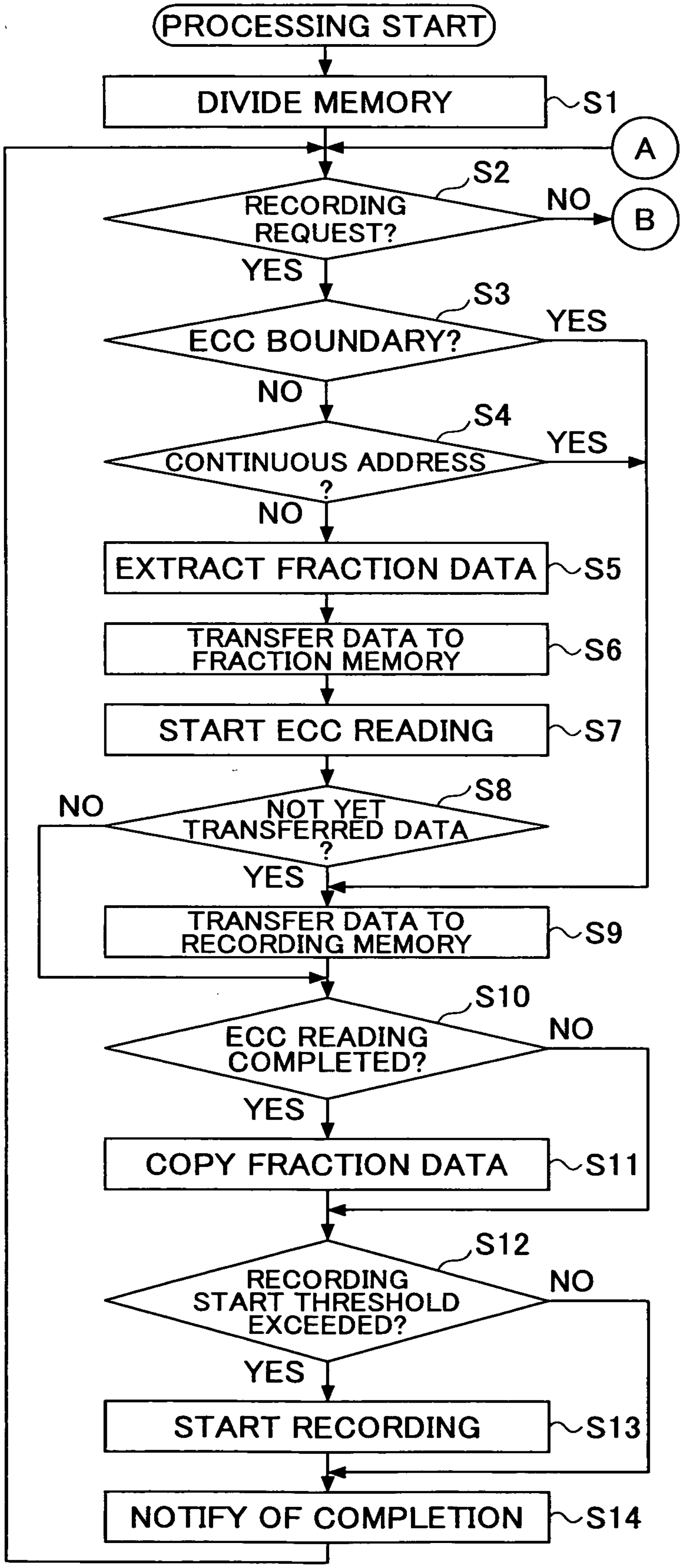
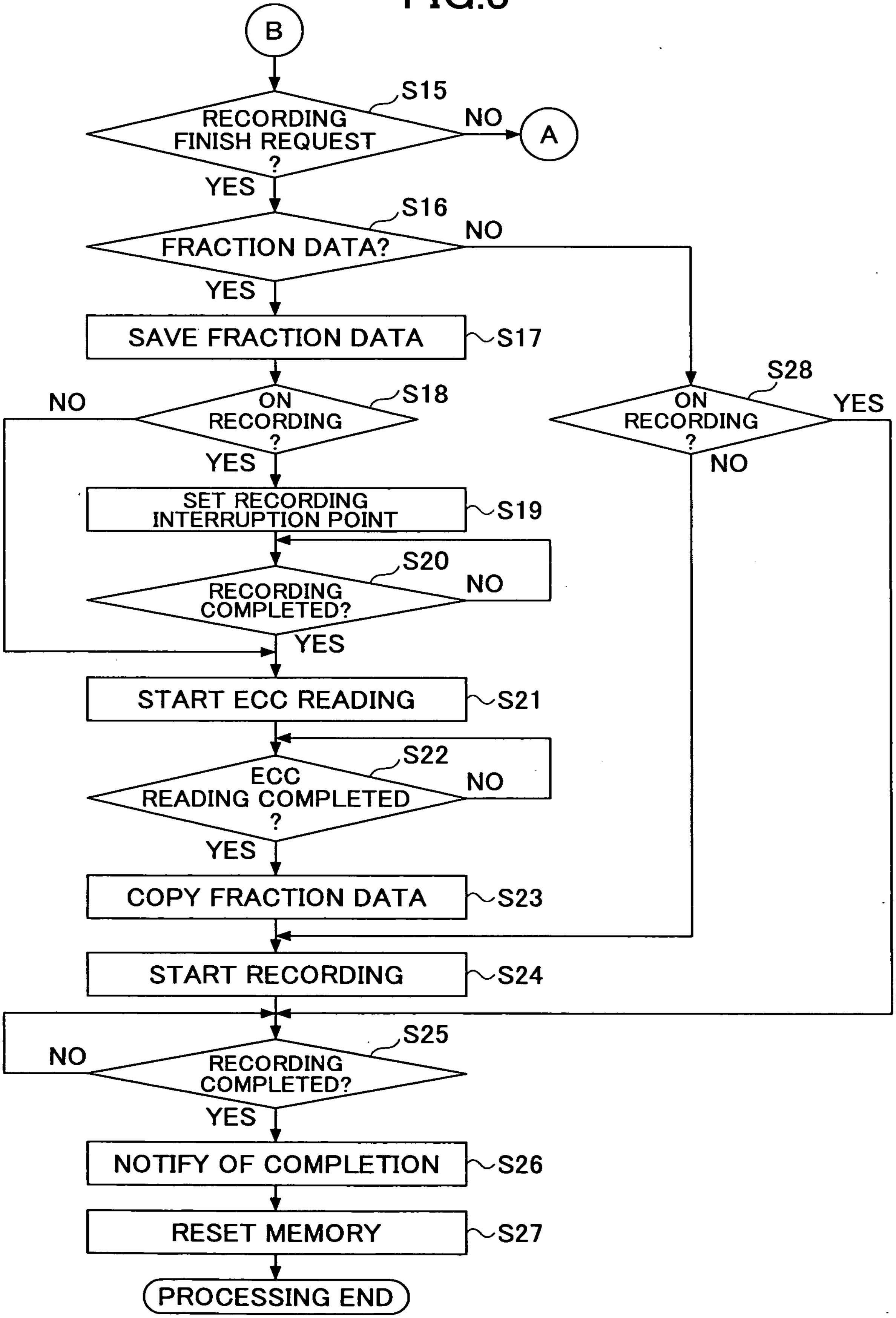

PROCESSING START
DIVIDE MEMORY
S1
A
S2
RECORDING REQUEST?
NO
B
YES
S3
ECC BOUNDARY?
YES
NO
S4
CONTINUOUS ADDRESS ?
YES
NO
EXTRACT FRACTION DATA
S5
TRANSFER DATA TO FRACTION MEMORY
S6
START ECC READING
S7
S8
NO
NOT YET TRANSFERRED DATA ?
YES
TRANSFER DATA TO RECORDING MEMORY
S9
S10
ECC READING COMPLETED?
NO
YES
COPY FRACTION DATA
S11
S12
RECORDING START THRESHOLD EXCEEDED?
NO
YES
START RECORDING
S13
NOTIFY OF COMPLETION
S14

FIG.8



B
S15
RECORDING FINISH REQUEST ?
NO
A
YES
S16
FRACTION DATA?
NO
YES
SAVE FRACTION DATA
S17
S18
ON RECORDING ?
NO
YES
S28
ON RECORDING ?
YES
NO
SET RECORDING INTERRUPTION POINT
S19
S20
RECORDING COMPLETED?
NO
YES
START ECC READING
S21
S22
ECC READING COMPLETED ?
NO
YES
COPY FRACTION DATA
S23
START RECORDING
S24
S25
RECORDING COMPLETED?
NO
YES
NOTIFY OF COMPLETION
S26
RESET MEMORY
S27
PROCESSING END

FIG.9

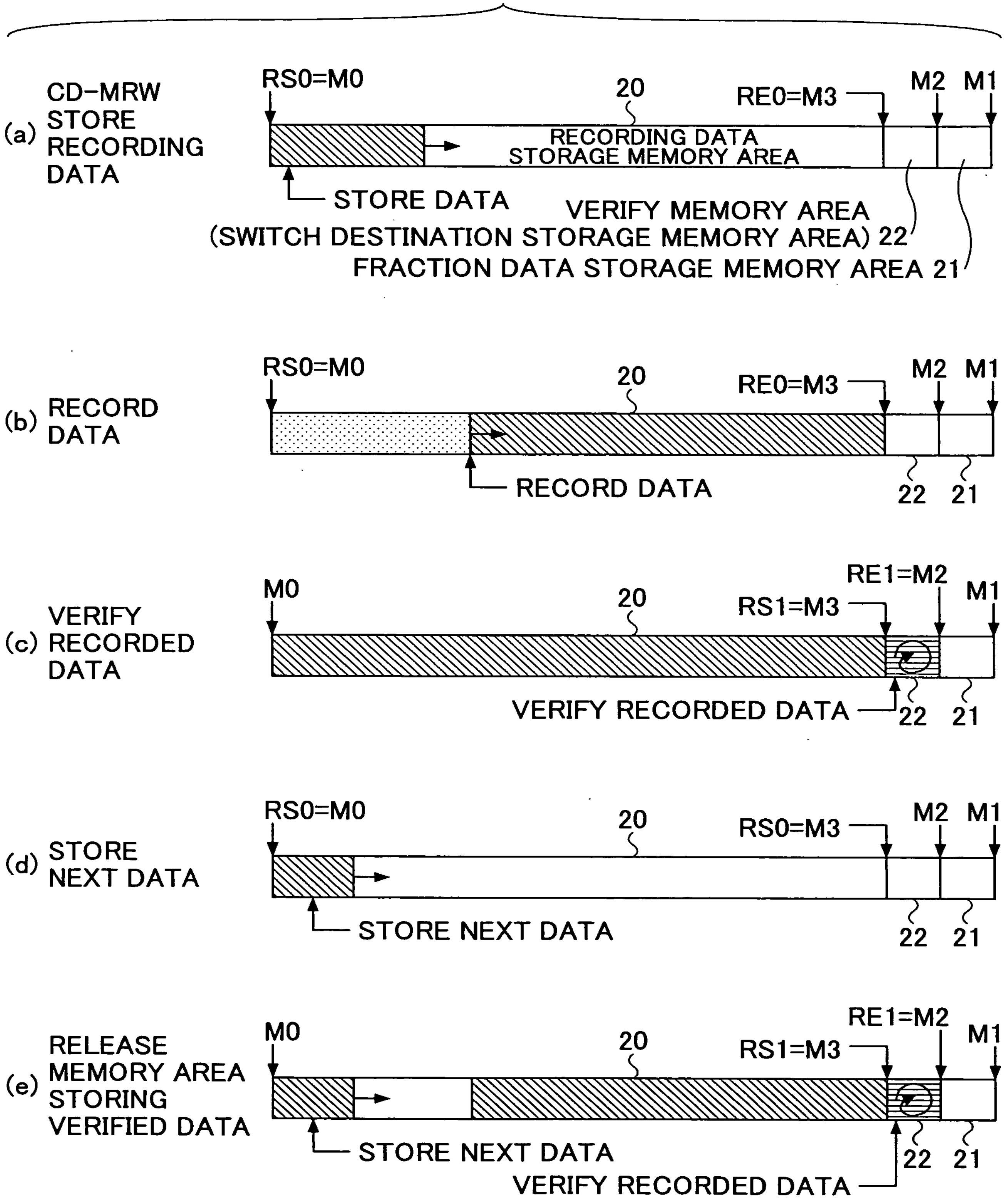

(a)
CD-MRW STORE RECORDING DATA
RS0=M0
20
RE0=M3
M2
M1
RECORDING DATA STORAGE MEMORY AREA
STORE DATA
VERIFY MEMORY AREA (SWITCH DESTINATION STORAGE MEMORY AREA) 22
FRACTION DATA STORAGE MEMORY AREA 21
(b)
RECORD DATA
RS0=M0
20
RE0=M3
M2
M1
RECORD DATA
22
21
(c)
VERIFY RECORDED DATA
M0
20
RS1=M3
RE1=M2
M1
VERIFY RECORDED DATA
22
21
(d)
STORE NEXT DATA
RS0=M0
20
RS0=M3
M2
M1
STORE NEXT DATA
22
21
(e)
RELEASE MEMORY AREA STORING VERIFIED DATA
M0
20
RS1=M3
RE1=M2
M1
STORE NEXT DATA
VERIFY RECORDED DATA
22
21

FIG.10

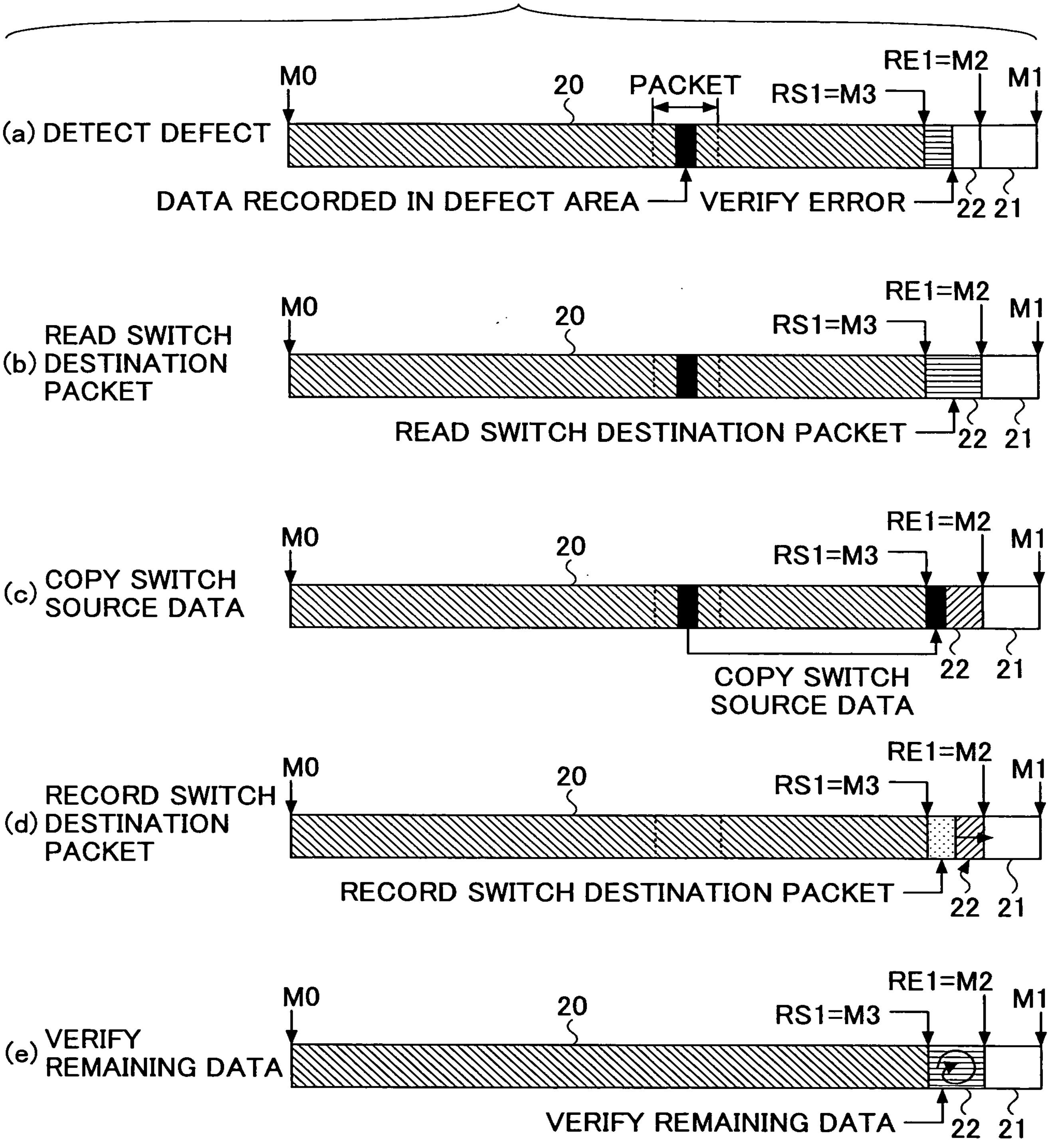

(a) DETECT DEFECT
M0
20
PACKET
RS1=M3
RE1=M2
M1
DATA RECORDED IN DEFECT AREA
VERIFY ERROR
22
21
(b) READ SWITCH DESTINATION PACKET
M0
20
RS1=M3
RE1=M2
M1
READ SWITCH DESTINATION PACKET
22
21
(c) COPY SWITCH SOURCE DATA
M0
20
RS1=M3
RE1=M2
M1
COPY SWITCH SOURCE DATA
22
21
(d) RECORD SWITCH DESTINATION PACKET
M0
20
RS1=M3
RE1=M2
M1
RECORD SWITCH DESTINATION PACKET
22
21
(e) VERIFY REMAINING DATA
M0
20
RS1=M3
RE1=M2
M1
VERIFY REMAINING DATA
22
21

FIG.11

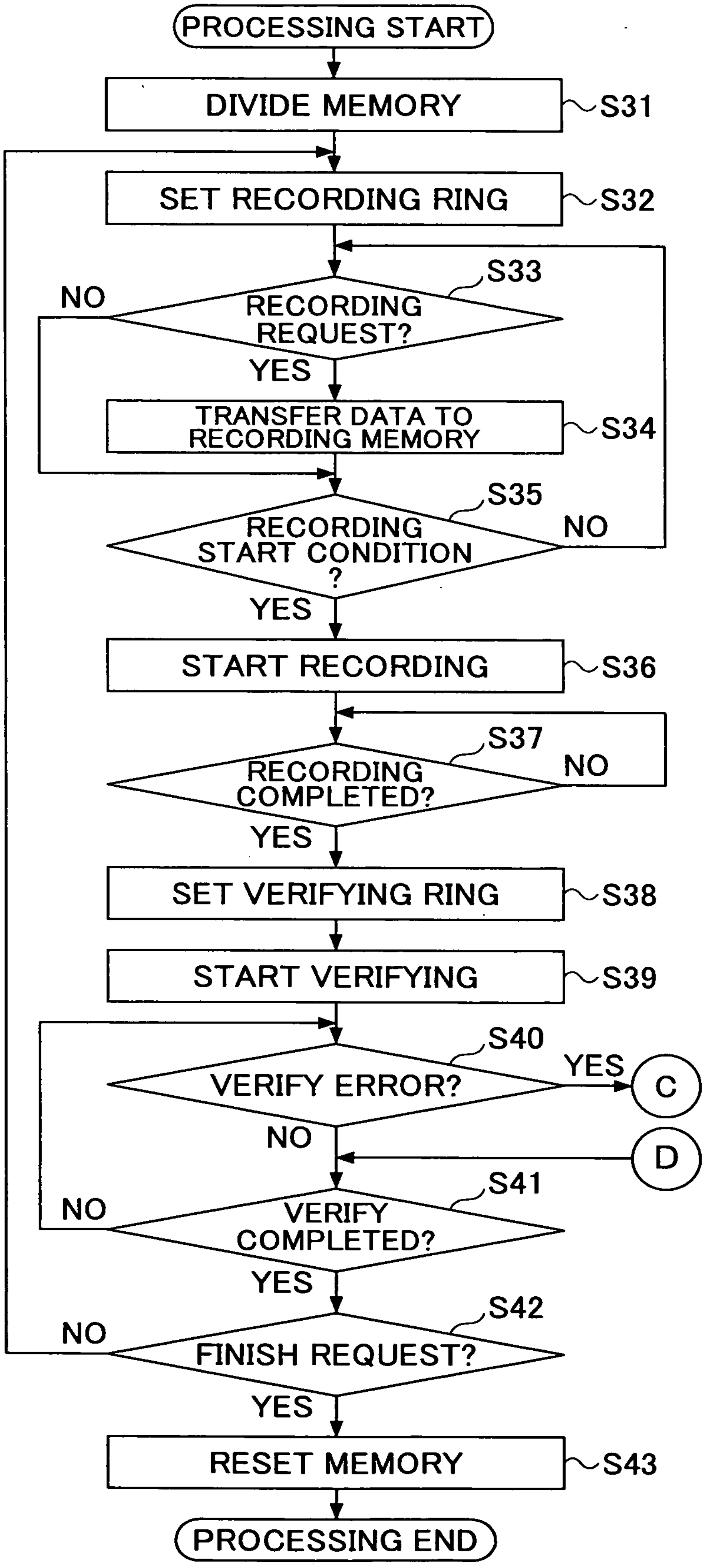

PROCESSING START
DIVIDE MEMORY
S31
SET RECORDING RING
S32
S33
RECORDING REQUEST?
NO
YES
TRANSFER DATA TO RECORDING MEMORY
S34
S35
RECORDING START CONDITION ?
NO
YES
START RECORDING
S36
S37
RECORDING COMPLETED?
NO
YES
SET VERIFYING RING
S38
START VERIFYING
S39
S40
VERIFY ERROR?
YES
C
NO
D
S41
VERIFY COMPLETED?
NO
YES
S42
FINISH REQUEST?
NO
YES
RESET MEMORY
S43
PROCESSING END

FIG.12

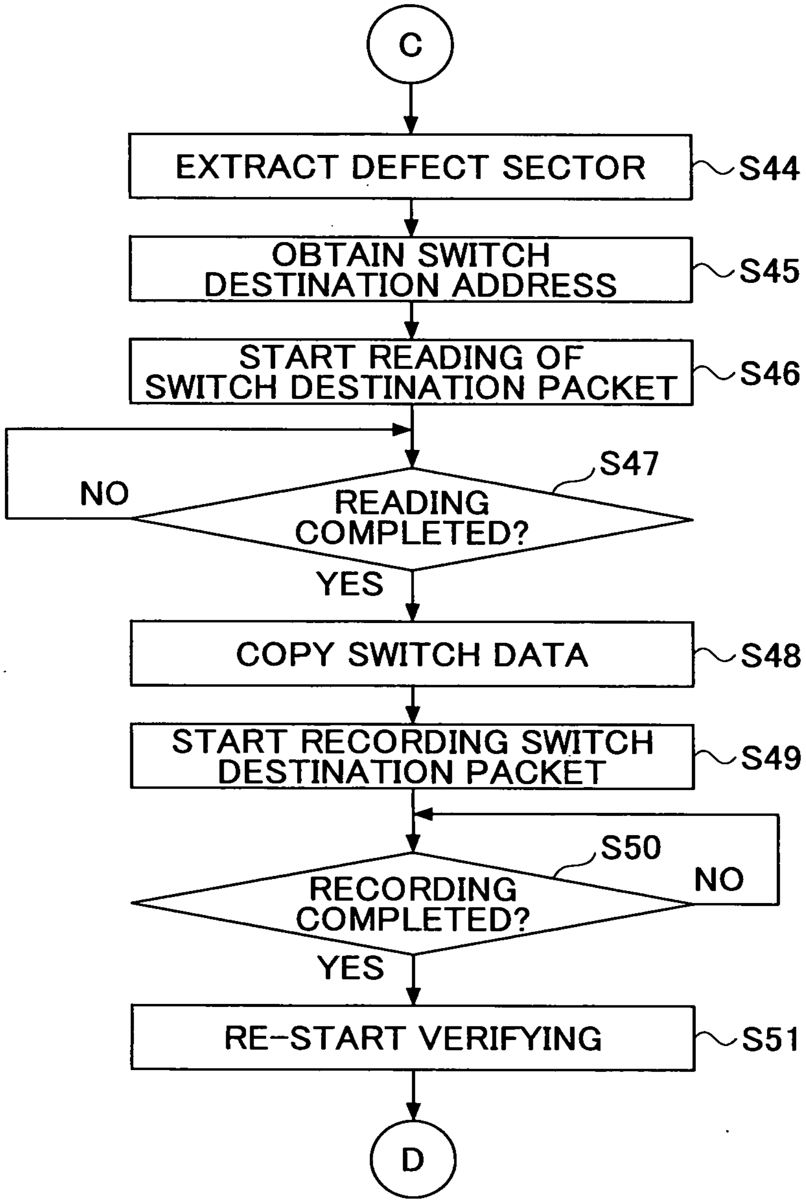

C
EXTRACT DEFECT SECTOR
S44
OBTAIN SWITCH DESTINATION ADDRESS
S45
START READING OF SWITCH DESTINATION PACKET
S46
S47
NO
READING COMPLETED?
YES
COPY SWITCH DATA
S48
START RECORDING SWITCH DESTINATION PACKET
S49
S50
NO
RECORDING COMPLETED?
YES
RE-START VERIFYING
S51
D

FIG.13

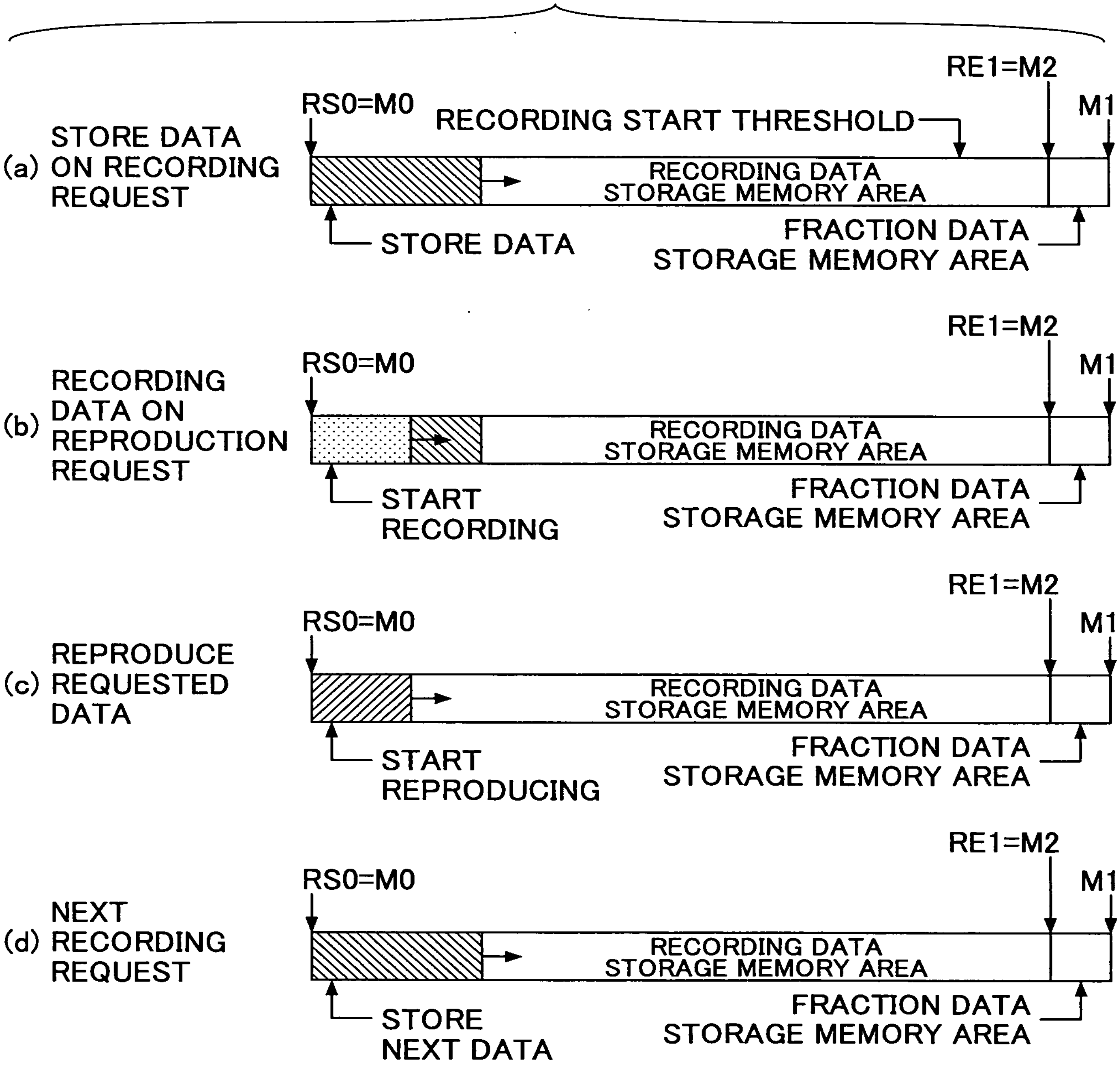

RE1=M2
RS0=M0
RECORDING START THRESHOLD
M1
(a) STORE DATA ON RECORDING REQUEST
RECORDING DATA STORAGE MEMORY AREA
STORE DATA
FRACTION DATA STORAGE MEMORY AREA
RE1=M2
RS0=M0
M1
(b) RECORDING DATA ON REPRODUCTION REQUEST
RECORDING DATA STORAGE MEMORY AREA
START RECORDING
FRACTION DATA STORAGE MEMORY AREA
RE1=M2
RS0=M0
M1
(c) REPRODUCE REQUESTED DATA
RECORDING DATA STORAGE MEMORY AREA
START REPRODUCING
FRACTION DATA STORAGE MEMORY AREA
RE1=M2
RS0=M0
M1
(d) NEXT RECORDING REQUEST
RECORDING DATA STORAGE MEMORY AREA
STORE NEXT DATA
FRACTION DATA STORAGE MEMORY AREA

FIG.14

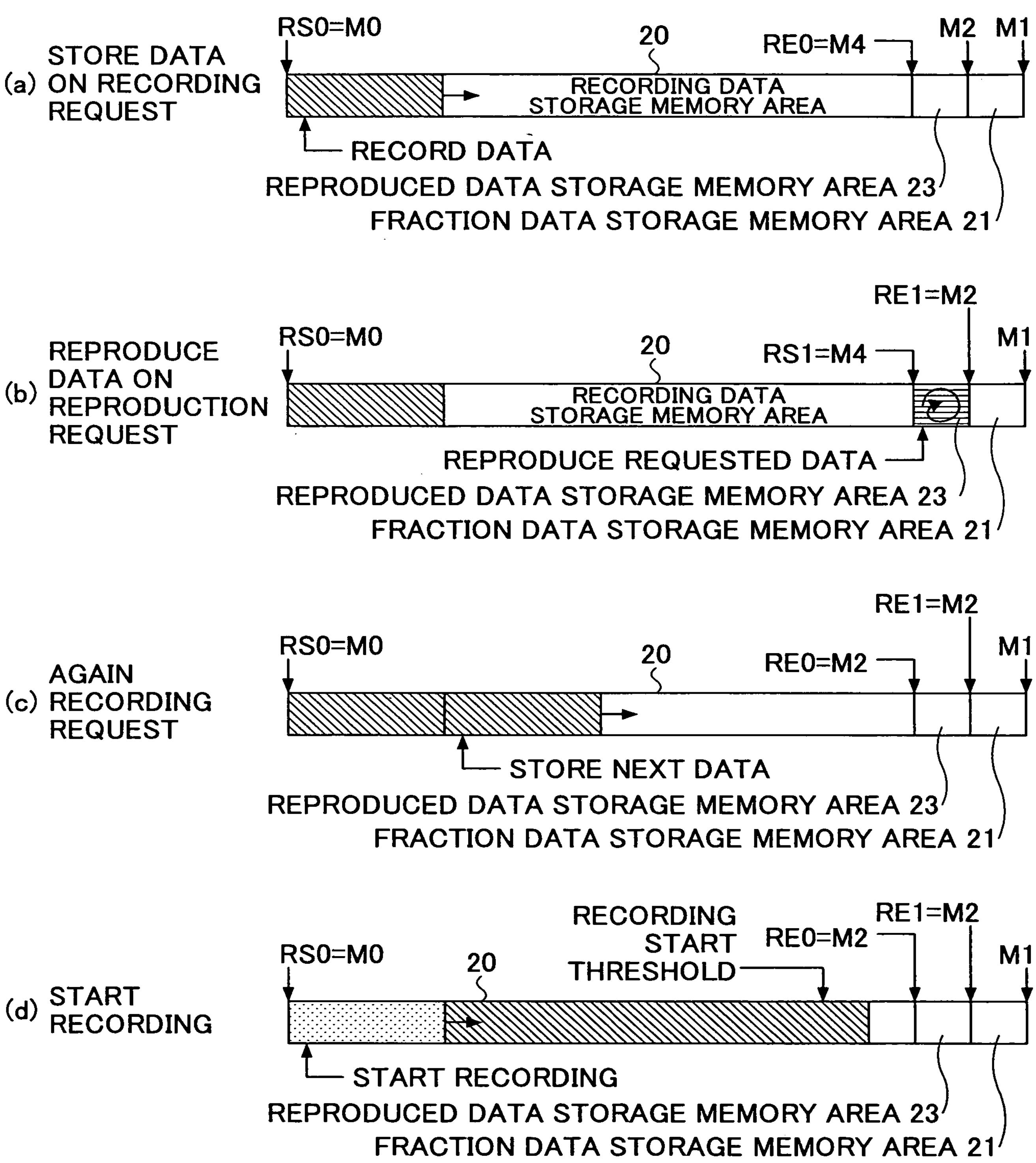

(a) STORE DATA ON RECORDING REQUEST
RS0=M0
20
RE0=M4
M2
M1
RECORDING DATA STORAGE MEMORY AREA
RECORD DATA
REPRODUCED DATA STORAGE MEMORY AREA 23
FRACTION DATA STORAGE MEMORY AREA 21
(b) REPRODUCE DATA ON REPRODUCTION REQUEST
RE1=M2
RS0=M0
20
RS1=M4
M1
RECORDING DATA STORAGE MEMORY AREA
REPRODUCE REQUESTED DATA
REPRODUCED DATA STORAGE MEMORY AREA 23
FRACTION DATA STORAGE MEMORY AREA 21
(c) AGAIN RECORDING REQUEST
RE1=M2
RS0=M0
20
RE0=M2
M1
STORE NEXT DATA
REPRODUCED DATA STORAGE MEMORY AREA 23
FRACTION DATA STORAGE MEMORY AREA 21
(d) START RECORDING
RECORDING START THRESHOLD
RE1=M2
RE0=M2
RS0=M0
20
M1
START RECORDING
REPRODUCED DATA STORAGE MEMORY AREA 23
FRACTION DATA STORAGE MEMORY AREA 21

FIG.15

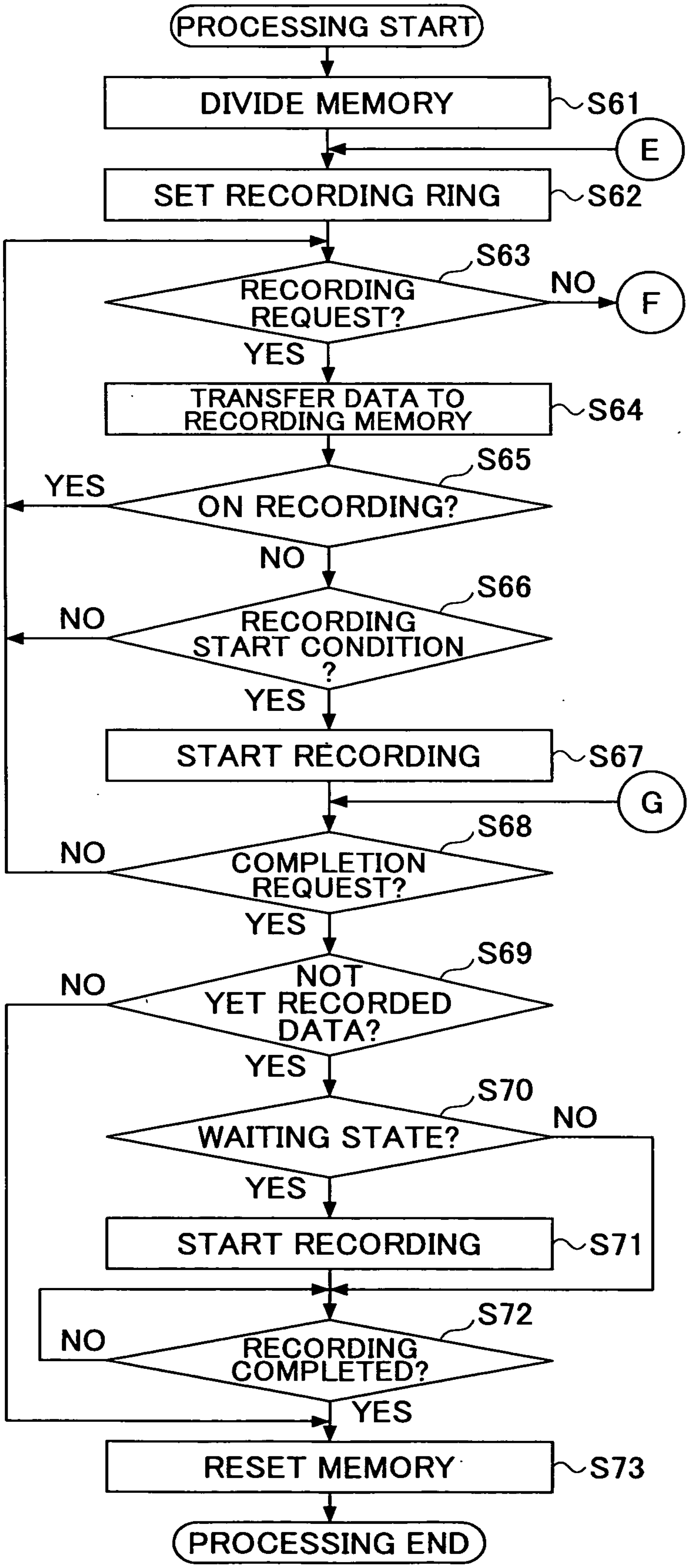
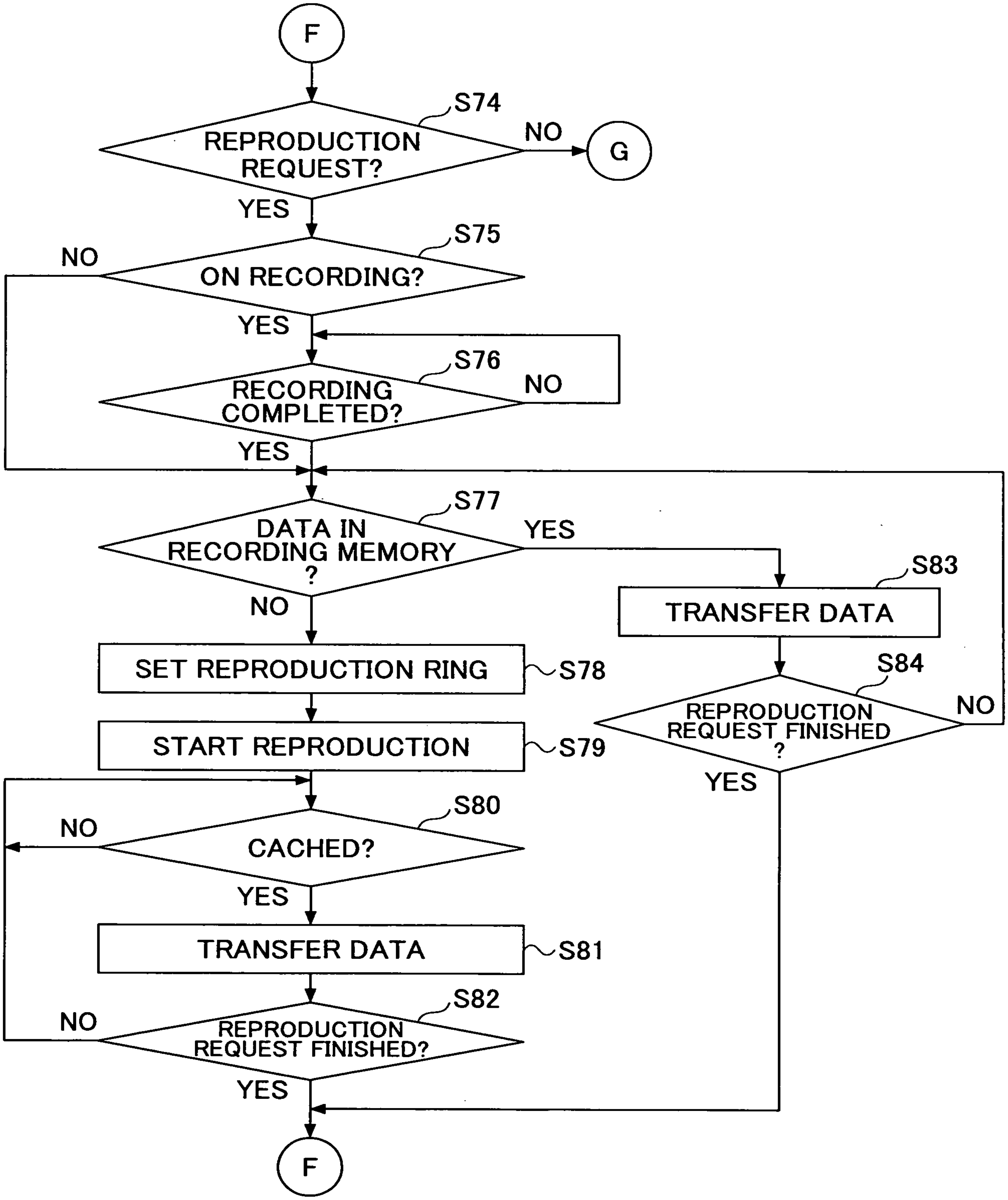

PROCESSING START
DIVIDE MEMORY
S61
E
SET RECORDING RING
S62
S63
RECORDING REQUEST?
NO
F
YES
TRANSFER DATA TO RECORDING MEMORY
S64
S65
YES
ON RECORDING?
NO
S66
NO
RECORDING START CONDITION ?
YES
START RECORDING
S67
G
S68
NO
COMPLETION REQUEST?
YES
S69
NO
NOT YET RECORDED DATA?
YES
S70
NO
WAITING STATE?
YES
START RECORDING
S71
S72
NO
RECORDING COMPLETED?
YES
RESET MEMORY
S73
PROCESSING END

FIG.16


F
S74
REPRODUCTION REQUEST?
NO
G
YES
S75
NO
ON RECORDING?
YES
S76
RECORDING COMPLETED?
NO
YES
S77
DATA IN RECORDING MEMORY ?
YES
S83
TRANSFER DATA
NO
SET REPRODUCTION RING
S78
S84
REPRODUCTION REQUEST FINISHED ?
NO
START REPRODUCTION
S79
YES
S80
NO
CACHED?
YES
TRANSFER DATA
S81
S82
NO
REPRODUCTION REQUEST FINISHED?
YES
F